BODY MASS INDEX AND AGE WITH ANKLE INJURY IN BASKETBALL PLAYER

Philipus Wiranata[1)], Henry R Handoyo[2)], Patricia M Kurniawan[3)]

ABSTRACT

Introduction: Ankle injuries occur when foot do some movements, such as twist or stretch the ankle. At certain point, this movement can cause ligament tears or dislocation. About 90 percent of all ankle injuries are sprain. Only 15 percent are ankle fracture. Ankle sprain is one type of ankle injury.
Aim: The purpose of this research was to determine the relationship between Body Mass Index (BMI) and Age with Ankle Injury in Basketball Player.
Methods: This research used cross sectional study method. The analysis used Spearman correlation test to evaluate the relationship of each variable. This observational analytic study started from 2017 August 1st until 2017 August 31st. The population of this study is 250 people. 145 of the 250 respondents are respondents who comply the criteria.
Result: Showed weak relationship (r= 0.227) and significant (p=0.006) for BMI and ankle injury. While, for age and ankle injury the result was weak relationship (r=0.310) and significant (p=0,000).
Conclusion: The conclusion of this research was the increasing of BMI and age results in high potential suffer from ankle injury.

Keywords: ankle injury, BMI, age, basketball player.

[1)]Student of Faculty Of Medicine Widya Mandala Catholic University Surabaya, Kalisari Selatan 1 Surabaya Email : Philipuswiranata@gmail.com
[2)]Surgery Department Faculty of Medicine Widya Mandala Catholic University Surabaya, Kalisari Selatan 1 Surabaya
[3)]Clinical Rehabilitation Department Faculty of Medicine Widya Mandala Catholic University Surabaya, Kalisari Selatan 1 Surabaya

INTRODUCTION

The ankle is a joint that is important to maintain the balance of our body. It is made up of bones, ligaments, tendons, and bundles of connective tissue. Tibia, calcaneus, fibula, and thallus are bones that form the ankle joint. The structure of the ankle is very complex and strong because it consists of ligaments which function to maintain ankle joint stability in various positions. An ankle injury can occur when the foot turns or twists on the leg, stretching the ankle at the point where it will tear the ligament or dislocation.[1,2]

An ankle injury is an injury that is often experienced by athlete as well as a knee injury. The most ankle injuries are sprain. Out of the 70 cases, 24 injuries were ankle injuries with a ratio of sprain and fracture as much as 8:1. Based on Alexandre's research, ankle injuries in recreational sports most often were sprain (49%), fracture (25%), contusion (17%), fasciitis (4%), tendon injuries (2%), dislocation (2%), and bursitis (1%).[3,4]

Ankle injuries account for 25% of all sports-related injuries. Injuries in basketball often occur in the lower extremities, where the ankles are the most common area. About 70% of basketball players have ankle sprains, 90% of ankle injuries are sprain and ankle fractures are only about 15%.[3,4,5]

Ankle sprain is a type of ankle injury. This can occur due to sudden turning and can also damage the lateral part of the ligament. It often occurs when the ankle is forced to withstand more than normal weights. Previous ankle sprains can trigger weak ankle conditions and easy to get ankle sprain.[2,6]

According to the emergency department records of the United States, the incidence of ankle sprain is the highest overall in the age range of 15 to 19 years. However, by the sex, these following results were obtained: men aged 14 to 24 years had a higher risk of ankle sprain compared to the opposite sex of the same age, and women over 30 years had a higher risk of ankle sprain which compared to the opposite sex of the same age. Out of all sports injuries, 10% to 34% are found at the ankles. According to Junaidi (2013), the incidence of sprain at Poliklinik KONI in Jakarta, from September to October 2012 amounted to 41.1% of 419 cases of injuries that occurred.[7,8]

Overweight and obese are risk factors for an injury. In several studies stated that obese (obesity) associated with sports injuries. Based on research on basketball players in America, the results show that basketball players with a high

body mass index (BMI) (> 25 kg/m2) have a risk of 4.2 times more prone to ankle injuries than those with lower BMI (<25 kg)/m2). Female basketball players who have a high BMI (>25 kg/m2) have a risk of developing an ankle injury 4.5 times greater than those who have a lower BMI (<25 kg/m2). Male basketball players who have a high BMI (>25 kg/m2) have a risk of ankle injury 2.7 times greater than those who have a lower BMI (<25 kg/m2).[9,10] With the data in and the absence of research on the relationship of BMI and age with ankle injuries, the researchers want to find out and examine whether there is a relationship between BMI and age with ankle injuries in basketball players. As a matter of fact, that most basketball player is often suffered ankle injuries.

METHODS

This study used observational analytic research methods and was carried out with a cross-sectional study design and then analyzed using the Spearman test.

The sample of this study were all basketball players at CLS Basketball Surabaya who met the criteria during the period of July and August 2017, amounting to 145 respondents from 250 total population. The inclusion criteria of this study are:

a. Basketball players whose age have the most frequent of incident (15 to 19 years) as well as those whose age does not have the most frequent of incident (<15 years)
b. Suffered an ankle injury in the past 6 months and vice versa
c. Willing to be a sample

The exclusion criteria of this study are:

a. Suffered an ankle injury in more than 6 months
b. Unwilling to be a sample

The sampling technique used in this study is non-probability sampling technique with the type of purposive sampling.

The study began by determining the study population, calculating the sample size, and collecting data. Before collecting data, the researcher must know the age of the respondent from the interview, know the history of ankle injury, and be willing to be a sample. These three things are useful so that research subjects meet the inclusion and exclusion criteria. Then the researchers collected data by interviewing and filling out questionnaires containing questions to basketball players at CLS Basketball Surabaya. Questions related to the data needed for the study are age and ankle injury. The IMT measurements were carried out using a height measurement tool as well as a weight measurement tool

and a CDC 2000 IMT table. Furthermore, the collected data was measured into the SPSS application and tested using the Spearman correlation test.

RESULTS

The total research subjects as many as 145 students, each consisting of 113 male students (77.9%) and 32 female students (22.1%).

From a total of 145 students who were the subjects of the study it was found that 83 students had a normal BMI, 39 students had an overweight BMI, 23 students had a BMI obese.

Table 1. The Distribution of Reasearch Subject Based on Body Mass Index (BMI).

No	BMI	Frequency (n)	Percentage
1.	Obesity	23	15,9%
2.	Over-weight	39	26,9%
3.	Normal	83	57,2%
Total		**145**	**100%**

From a total of 145 students who were the subjects of the study, it was found that 38 students whose age have the most frequent incidents, and 107 students whose age were not the most frequent incidents.

Table 2. The Distribution of Research Subject Based on Age

No	Age	Frequency (n)	Percentage
1	The most frequent of incident (15 to 19 years)	38	26,2%
2	The unfrequent of incident (<15 years)	107	73,8%
Total		**145**	**100%**

From a total of 145 students who were the subjects of the study, it was found that 73 students suffered an ankle injury in the past 6 months, and 72 students did not suffer an ankle injury in the past 6 months.

Table 3. The Distribution of Reasearch Subject Based on Ankle Injury.

No	Ankle Injury	Frequency (n)	Precentage
1	Suffered from it	73	50,3%
2	Not suffered from it	72	49,7%
Total		**145**	**100%**

From a total of 73 students who have had ankle injuries, it was found that 32 students have had a right ankle injury, 20 students have had a left ankle injury, and 21 students have had both legs ankle injuries.

Table 4. The Distribution of Research Subject Based on the Ankle

No	Ankle	Frequency (n)	Percentage
1	Right Left	32	43,8%
2	Both	20	27,4%
3	right and left	21	28,8%
Total		**73**	**100%**

From a total of 73 students who have had ankle injuries, it was found that: 17 students have had ankle injuries with a painful inner side, 42 students have suffered an ankle injury with a painful external side, and 14 students have suffered an ankle injury with both internal and external sides (at a different time).

Table 5. The Distribution of Research Subject Based on the Ankle Side

No	Ankle Side	Frequency (n)	Percentage
1	Internal Extenal	17	23,3%
2	Both	42	57,5%
3	internal and external	14	19,2%
	Total	**73**	**100%**

Based on Table 6, it was found that the highest percentage was in the age group 60 to 74 years (Elderly) and >90 years (Very Old) with normal depression rates of 30.4% and 2.2%. The highest percentage is in the age group 75 to 90 years (Old) with the level of normal and mild depression is as large as 21.7%.

Table 6. The Distribution of Research Subject Based on the Treatment

No	Treatment	Frequency (n)	Percentage
1	Untreated	11	15,1%
2	Compress		
3	Treated by a Doctor	46	63%
	Treated by a	3	4,1%
4	Massage Therapist (*sin she*)	13	17,8%
	Total	**73**	**100%**

From a total of 83 students who had a normal BMI, it was found that 34 students had an ankle injury and 49 students had never had an ankle injury. Besides, out of the 39 students who had an overweight BMI, 23 had an ankle injury and 16 had never had an ankle injury. Moreover, out of the 23 students who had obesity BMI, 16 students had suffered from ankle injury and 7 students had never had an ankle injury.

Based on the Spearman test, it obtained the significance value of 0.006. The significance value which less than 0.05 indicates that Ho was rejected and Ha was accepted so it can be concluded that there is a relationship between BMI and ankle injury in basketball players.

Table 7. Cross table of BMI with ankle injury

		Ankle Injury		Total
		Yes	No	
BMI	Obesity	16 (69,6%)	7 (30,4%)	23 (100%)
	Overweight	23 (59%)	16 (41%)	39 (100%)
	Normal	34 (41%)	49 (59%)	83 (100%)
Total		73	72	145

Out of the 38 students whose age have the most common incident, 29 students had suffered from ankle injuries and 9 students had never had an ankle injury. Moreover, from 107 students whose age does not have the most common incident, 44 students had suffered from an ankle injury and 63 students had never had an ankle injury.

Based on the Spearman test, it obtained the significance value of 0,000. The significance value that is much smaller than 0.05 indicates that Ho was rejected and Ha was accepted so it can be concluded that there is a relationship between age and ankle injury in basketball players.

Table 8. Cross table of age with ankle injury

		Ankle Injury		Total
		Yes	No	
Age	The most frequent of age (15-19 tahun)	29 (76,3%)	9 (23,7%)	38 (100%)
	The unfrequent of age (<15 tahun)	44 (41,1%)	63 (58,9%)	107 (100%)
Total		73	72	145

DISCUSSION

In this study the researchers took samples at CLS Basketball Surabaya, because the target of the researchers was basketball players so the researchers chose the place. Researchers chose the place for several reasons, namely: adequate facilities, a large number of students, and has a well-organized structure. The number of samples obtained was 145 students from 152 students who had been calculated using the formula of the number of samples, with a total of 250 students, this was due to the limited number of respondents who were included in the criteria to be sampled in this study. So the sample obtained was 145 students. From a total of the 145 students, it was found that there were 73 students (50.3%) who had suffered an ankle injury in the past 6 months and 72 students (49.7%) who had never suffered an ankle injury in the past 6 months. These results support one study statistic which states that of all ankle sprain incidents 41.1% of the data was experienced by basketball players, 9.3% rugby players, 7.9% soccer players.7 Wherein 90% of wrist injuries foot is sprain and ankle fracture is only about 15% .5 The result of ankle injury is found to be not too significant in number compared to the uninjured one, because researchers only set the limit within 6 months, if more than 6 months it has fulfilled the exclusion criteria and excluded from the research.

Respondents who were in the normal BMI group were 83 students and 34 of them had experienced ankle injuries in the last 6 months (41%). 39 respondents were in the overweight BMI group and 23 of them had experienced ankle injuries in the past 6 months (59%). 23 respondents were in the obese BMI group and 16 of them had experienced ankle injuries in the past 6 months (69.6%). In this study, the obese BMI group had the highest percentage of respondents who had suffered an ankle injury in the past 6 months and followed by the overweight BMI group, while the normal BMI group had the lowest percentage (<50%). There is a trend where the greater the BMI of the respondents, the more they have experienced ankle injuries in the past 6 months.

In fact, the respondents have various ages. The researchers divided them into 2 large groups according to the literature review of researchers, namely, the age group with the most frequent incidents and the non-age group with the most frequent incidents, it was found that there were 29 respondents from 38 respondents who had experienced ankle injuries in the group age with the most frequent incidence (76.3%). It was found that there were 44 respondents out of 107 respondents who had suffered ankle injuries in the non-age group with the most frequent incidents (41.1%). This shows that the age group with the most frequent incidence has had an ankle injury.

Respondents who have suffered ankle injuries in the last 6 months there were 73 respondents found that, there were 32 respondents had right ankle injury (43.8%), 20 respondents had left ankle injury (27.4%), and 21 respondents had injuries to the right and left ankles (28.8%). The dominant side of the foot has an influence on the occurrence of ankle sprain.[13]

There were 73 respondents who had experienced ankle injuries in the past 6 months, found that, there were 17 respondents experiencing pain on the inside of the ankle (23.3%), 42 respondents had pain on the outside of the ankle (57.5%), and 14 respondents had experienced pain on the inside and outside on different occasions at one time (19.2%). These results are in accordance with the theory that inversion injuries to the ankles account for approximately 25% of all musculoskeletal system injuries and 50% of all sports injuries. These injuries mostly result from excessive inversion of the legs and combined with external rotation of the legs.[11]

From the results of the treatment that have done by the respondents when suffering an ankle injury were grouped into 4 ways and the results obtained were: 11 respondents were left it alone (15.1%), 46 respondents were compressed with ice or cold water (63%), 3 respondents were taken to the doctor (4.1%), 13 respondents were taken to a masseur or *sin she* (17.8%). This shows that the respondent's level of knowledge about the initial management of ankle injuries is quite good, because there are 63% of respondents who have done the initial treatment well, namely by compressing ice or cold water on the injured ankle, even though there is still something left alone or taken to a massage therapist. We recommend that before being taken to the doctor should be compressed with ice or cold water first, in order to reduce pain and reduce edema and reduce bleeding due to vasoconstrictive effects of blood vessels.[11]

1. The Relationship of BMI with Ankle Injury in Basketball Players

From the statistical test results using Spearman, it obtained p value of 0.006 (p <0.05) and the correlation strength of 0.227. This shows that there is a significant relationship with the strength of weak and unidirectional correlation between BMI and ankle injuries.[12] The higher the BMI value, the potential for ankle injury will increase. From the results of the Spearman test, it can be concluded that the researcher's hypothesis is accepted that there is a relationship between BMI and ankle injury in basketball players.

This is consistent with the theory that overweight and obese are risk factors for an injury. In several studies stated that obese (obesity) associated with sports injuries. Based on research on basketball players in America, the results show that basketball players with a high body mass index (BMI) have a risk of 4.2 times more susceptible to ankle injuries than those who have a lower BMI. Female basketball players who have a high BMI have a risk of getting an ankle injury 4.5 times greater than those who have a lower BMI. Male basketball players who have a high BMI have a risk of getting an ankle injury 2.7 times greater than those who have a lower BMI.[13]

Height and weight have an influence on the increased risk factors of ankle sprain. The higher our BMI will also increase the risk factors for ankle sprain. This is because when we jump and land in an inverse ankle position the pressure on the lateral ligaments increases and aggravates the injury, compared to people who have ideal height and weight.[13] Obesity can also worst the condition of the joints and cause a decrease in muscle significant tissue.[14]

2. The Relationship of Age with Ankle Injury in Basketball Players

From the statistical test results using Spearman, it obtained p value of 0,000 (p <0.05) and the correlation strength of 0.310. This shows that there is a significant relationship with the strength of a weak and unidirectional correlation between age and ankle injury. The older the age, the more potential for ankle injuries will increase. From the results of the Spearman test, it can be concluded that the hypothesis the researcher accepted is that there is a relationship between age and ankle injuries in basketball players.

This is consistent with the statement according to the emergency department records of the United States, the highest incidence of ankle sprain in the age range of 15 to 19 years.[7] Therefore, the researchers divided into 2 major groups namely: the age group with the

most frequent incidents and the non-age group with most frequent incident.

According to the theory, the adolescence (12 to 25 years) tend to have high activity and there is a surge in growth that causes the ligaments to become less elastic as in childhood (5 to 11 years). An elastic ligament is certainly an advantage so that it is not susceptible to injury when falling or when running. It takes a strong force so that there is a stretch or tear in the ligament, therefore in childhood it is rarely affected by injury than during adolescence.[15,16]

CONCLUSION

From research on the relationship of BMI and age with ankle injuries in basketball players, at CLS Basketball Surabaya, in 2017, the following conclusions can be drawn:

1. There is a relationship between the strength of weak and unidirectional correlation between BMI with ankle injury in basketball players
2. There is a relationship between the strength of weak and unidirectional correlation between age and ankle injury in basketball players

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